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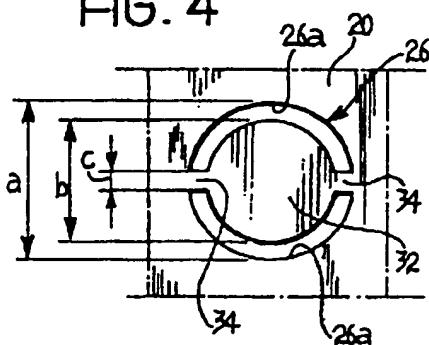
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(54) A disposable cartridge for use in a machine for the extraction and delivery of beverages

(57) A disposable cartridge, containing or adapted to contain a dose of a water-soluble product for preparing a beverage, includes a substantially cylindrical casting of substantially rigid injection-moulded plastics material, with an inlet wall (20) having one or more water-inlet apertures (26) located near its periphery. The or each inlet aperture is defined by a slot (26) substantially in the form of an annulus which delimits a central wall area (32) integrally connected to the rest of the inlet wall (20) by at least one radial bridge (34) formed of the plastics material constituting the inlet wall (20).

FIG. 4



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**Description**

[0001] The present invention relates to a disposable cartridge according to the preamble to Claim 1.

[0002] In disposable cartridges of the type under consideration, an example of which is disclosed in document EP-A 0 057 671, the water inlet apertures are or are apertures constituted by one or more holes or ducts located near the periphery of the lid.

[0003] This arrangement is advantageous since the water under pressure which rushes into the casing through these apertures or ducts forms one or more jets which, even if they reach the bottom wall of the container, are not able to flow out of the cartridge immediately, since this wall has no holes. The water flow is thus forced back into the casing and must follow a relatively long path to reach the central outlet duct. As a result, all the water-soluble product contained in the cartridge is easily dissolved and washed away in the water as it flows to the outlet.

[0004] In order to make the water enter the cartridge in the form of one or more jets, the inlet aperture or apertures are constituted by holes or passages with an extremely small cross-section, of the order of a millimetre, for example.

[0005] In order to form these holes or ducts, the moulds in which the lids of the cartridges are injection-moulded must have corresponding plugs constituted by pins having the same extremely small diameter. It is easy to see that these minute pins are very vulnerable and liable to break easily: in the case of very large-scale production of cartridges, of the order, for example, of several thousands of units a day, the use of these fragile pins is inadmissible, since it would require frequent and costly repairing of the moulds.

[0006] The object of the invention is to provide a cartridge of the type under consideration, which is suited to large-scale production, by injection moulding, without the need for tiny, fragile pins in the moulds in order to form the apertures, while retaining the advantage which these apertures provide of causing the water to rush into the cartridge in the form of one or more jets.

[0007] According to the invention this object is achieved by providing a disposable cartridge as claimed.

[0008] Thanks to the claimed arrangement, the apertures can be formed by plugs in the injection mould which are not constituted by thin, fragile pins but by elements having a greater diameter, which are far more robust and durable.

[0009] If, for example, apertures with one radial bridge are to be formed, the plugs will take the form of tubular elements with a longitudinal slot corresponding to the said bridge; if apertures with two diametrically opposed bridges are to be formed, each plug will be in the form of a pair of half-shells having an almost semi-circular section, separated by gaps corresponding to the two bridges.

[0010] In the description which follows, with reference to the drawings, an example will be given of the plugs of a size to produce apertures of the type claimed, with a cross-section equivalent to that of a circular hole with a diameter of the order of a millimetre.

[0011] The invention will be better understood from the reading of the detailed description which follows, made with reference to the appended drawings, provided purely by way of non-limitative example, in which:

Figure 1 is a perspective view of a disposable cartridge according to a preferred embodiment of the invention,

Figure 2 is a transverse section taken on the diametral plane II-II of Figure 1,

Figure 3 is a partial section, on an enlarged scale, taken on a chordal plane indicated III-III in figure 2, Figure 4 is a partial plan view in the direction of the arrow IV of Figure 3,

Figure 5 is a partial section which represents, on a larger scale, the part indicated V in Figure 2, and Figure 6 is a plan view in the direction of the arrow VI of figure 5.

[0012] With reference to Figures 1 and 2, a disposable cartridge includes a flattened, substantially cylindrical casing, generally indicated 10. The casing 10 is adapted to contain a single dose of a granular, powder or particulate water-soluble product suitable for the production of a single mug or cup of a beverage. The casing 10 could, however, contain a quantity of water-soluble substance for the simultaneous production of two or more mugs or cups of a beverage.

[0013] The casing 10 is constituted by two parts of substantially rigid injection-moulded plastics material formed together and suitable for contact with foodstuffs. One of these parts, generally indicated 12, is a cup-shaped container; the other part, generally indicated 14, is a lid.

[0014] The container 12 comprises a substantially cylindrical side wall 16, with no perforations, constituting the side wall of the casing 10, and a bottom wall 18 which constitutes an outlet end wall of the container 10 and which also has no perforations, with an exception as described later.

[0015] The lid 14 comprises a flat disc-shape wall 20 which constitutes an inlet wall of the casing 10. The outer surface of the inlet wall 20 is surrounded by a peripheral annular flange 22 with a raised annular portion or rib 24 adapted to cooperate with a tight seal with a pressure and delivery plate of a machine for the extraction and delivery of beverages, such as that described and illustrated in document EP-A-0 041 931.

[0016] Inlet apertures, indicated 26 in figures 1 and 2, are formed in the inlet wall 20 and their configuration will be described later with reference to Figures 3 and 4.

[0017] With reference once again to Figures 1 and 2, a tubular projection 28 extends from the centre of the

bottom wall 18 of the container 12 towards the inlet wall 20, thus forming an outlet duct for the beverage.

[0018] At its end facing the inlet wall 20, the tubular projection 28 has a transverse partition 30 with an outlet aperture for the beverage from the cartridge. This outlet aperture will be described with reference to Figures 5 and 6.

[0019] Reference will now be made to Figures 3 and 4 to describe the shape of one of the apertures 26.

[0020] The aperture 26 is defined by a slot substantially in the form of an annulus which delimits a central area 32 which is integrally connected to the remaining portion of the inlet wall 20 by a pair of diametrically opposed bridges 34.

[0021] The bridges 34 divide the annular aperture 26 into two portions 26a in the shape of segments of an annulus, each extending through almost 180°.

[0022] In Figure 4, the outer diameter of the aperture 26 is indicated a, the inner diameter b and the width of the bridges 34 is indicated c.

[0023] Very good results, with regard to the formation of energetic jets of water from two diametrically opposed eccentric inlet apertures 26 towards the interior of the cartridge, were achieved with the following dimensions:

$$a = 3.35 \text{ mm}$$

$$b = 2.75 \text{ mm}$$

$$c = 3.4 \text{ mm}$$

[0024] It may be calculated that the inlet flow cross section formed by the two portions 26a of the aperture is equivalent to that of a small hole having a diameter of around 1 mm.

[0025] It will be understood that it is not convenient to form a circular hole, corresponding to one of the apertures 26 with a plug constituted by a pin having such a minute diameter, since a pin of this type would be too vulnerable.

[0026] On the other hand, an annular aperture such as that of Figures 3 and 4 may be obtained with a plug constituted by two half-shells having the dimensions a, b and c specified above and thus far more robust for the same size of inlet aperture flow cross section.

[0027] Preferably, as shown in Figures 5 and 6, the outlet aperture also has a similar shape to that of the inlet apertures 26. The transverse partition 30 has an outlet aperture constituted by a slot 36 substantially in the form of an annulus. This slot 36 further delimits a central wall area 38 which is integrally connected to the tubular projection 28 by a pair of diametrically opposed radial bridges 40, made of the plastics material constituting the projection 28 and the partition 30.

[0028] The dimensions of the two halves, indicated 36a, of the outlet aperture 36 are similar to, but slightly larger than, those of the two inlet apertures 26. For example, if with the aforesaid dimensions a, b and c the total area of the two inlet apertures 26 is of little less

than 2 mm<sup>2</sup>, the area of the outlet aperture 36 can be, advantageously, of little more than 1 mm<sup>2</sup>.

[0029] These dimensions ensure that when the pressurised water flows through the inlet apertures 26 into the cavity of the cartridge 10, a counterpressure is created which ensures that all the product contained in the cartridge is dissolved.

[0030] The embodiment illustrated in the drawings is not limitative. For example, while still being substantially in the form of annuli, the inlet apertures 26 or the outlet apertures 36 could have only one radial bridge such as 34 or 40 or, on the other hand, more than two bridges, preferably angularly equidistant.

[0031] In the same way, an inlet wall such as 20 could have only one water-inlet aperture 26, arranged as in document EP-A-O 057 671, or more than two water-inlet apertures located near the periphery of the inlet wall, and preferably angularly equidistant.

## 20 Claims

1. A disposable cartridge including a substantially cylindrical casing (10), containing or adapted to contain a dose of a water-soluble product for preparing a beverage, in which the casing (10) is constituted by injection-moulded parts of substantially rigid plastics material coupled together, one of which is a cup-shaped container (12), and the other of which is a lid (14) with a disc-shaped inlet wall (20), and in which the lid (14) has one or more water inlet apertures (26) located near its periphery and the cup-shaped container (12) includes a bottom wall (18) with a central tubular projection (28) extending axially towards the inlet wall (20) and defining an outlet duct for the beverage, characterised in that the or each water-inlet aperture (26) is defined by a slot substantially in the form of an annulus, delimiting a central wall area (32) integrally connected to the rest of the inlet wall (20) by at least one radial bridge (34) formed of the plastics material constituting the inlet wall (20).
2. A disposable cartridge according to Claim 1, characterised in that the tubular projection (28) has, at the end thereof facing the inlet wall (20), a transverse partition (38) in which a circular slot (36), substantially in the form of an annulus is defined, which constitutes an outlet aperture for the beverage and delimits a central wall area (38) which is integrally connected to the tubular projection (28) by at least one radial bridge (40) formed of the plastics material constituting the projection (28) and the partition (30).
3. A disposable cartridge according to Claim 1 or Claim 2, characterised in that the central wall area (32; 38) of the inlet (26) and/or outlet (36) apertures is connected to the rest of the inlet wall (20) and/or

the tubular projection (28), respectively, by a pair of diametrically opposite bridges (34; 40).

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FIG. 1

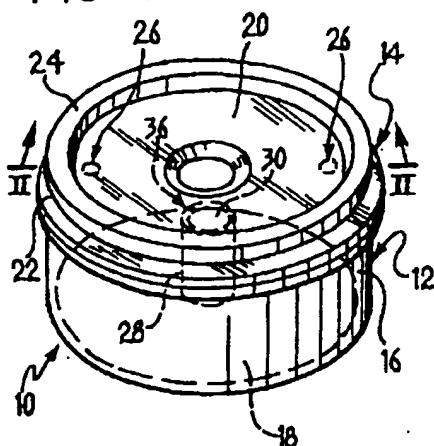


FIG. 2

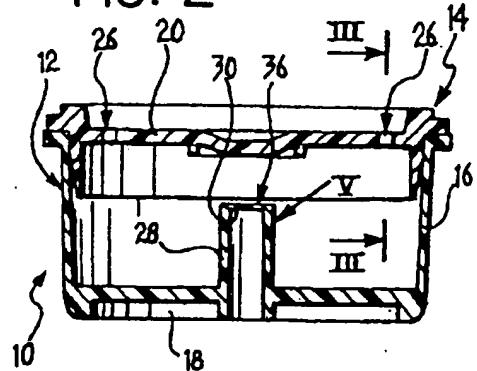


FIG. 3

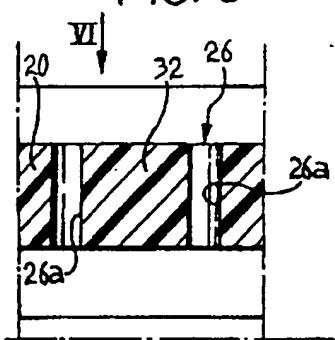


FIG. 4

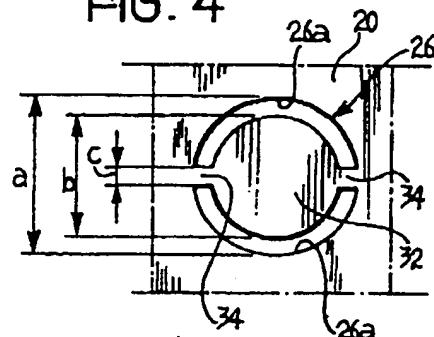


FIG. 5

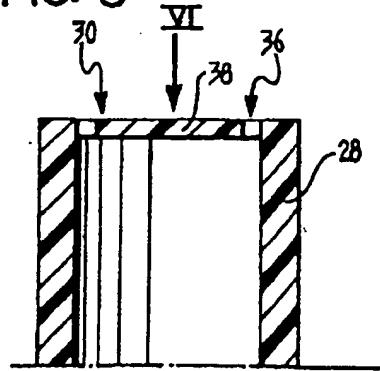
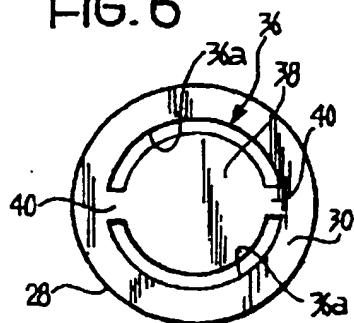


FIG. 6





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## EUROPEAN SEARCH REPORT

Application Number  
EP 00 10 7321

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
D,A	EP 0 057 671 A (UNOPER S.R.L.) 11 August 1982 (1982-08-11) * page 5, line 15 - page 10, line 6; figure 2 *	1	A47J31/06 B65D81/00
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.)
			A47J B65D
<p>Place of search: THE HAGUE Date of completion of the search: 31 July 2000 Examiner: Bodart, P</p> <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons S : member of the same patent family, corresponding document</p>			

ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 00 10 7321

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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